REMARKS

Claims 9 and 15 have been amended. Claims 1 through 15 remain in the application.

Claims 1 through 15 were rejected under 35 U.S.C. § 103 as being unpatentable over "Handbook of Simulation" edited by Jerry Banks in view of "Simulation Modeling with Event Graphs" by Lee Schruben. Applicants respectfully traverse this rejection.

The "Handbook of Simulation", edited by Jerry Banks, discloses principles, methodology, advances, applications, and practice. An entity represents an object that requires explicit definition. An entity can be dynamic in that it "moves" through the system, or it can be static in that it serves other entities. An entity may have attributes that pertain to that entity alone. Thus attributes should be considered local values. A resource is an entity that provides service to dynamic entities. The resource can serve one or more than one dynamic entity at the same time (i.e., operate as a parallel server). A dynamic entity can request one or more units of a resource. Verification concerns the operational model. Is it performing properly? Validation is the determination that the conceptual model is an accurate representation of the real system. If the client has been involved throughout the study period, and the simulation analyst has followed all the steps rigorously, the likelihood of a successful implementation is increased. Banks does not disclose constructing a flowchart that describes interaction of an operator in a workcell using a computer wherein such interaction comprises sequential operations and asynchronous operations and modeling the operator as an input to a programmable logic controller (PLC) by writing a control model of the operator interaction in the workcell based on predefined conditions described in the flowchart. Banks also does not disclose testing the control model by a PLC logical verification system on the computer as to whether PLC logic for the workcell is correct. Banks further does not disclose loading the PLC logic in the PLC controlling the

workcell if the PLC logic for the workcell is correct and using the PLC logic by the PLC to operate the workcell.

The "Simulation Modeling with Event Graphs" by Lee Schruben discloses that an event graph can be used to develop alternative event-oriented representations of a system. Several candidate model structures can be considered for possible implementation as discrete-event simulations using an event-scheduling approach. Applications of basic graph analysis techniques are illustrated in the context of two examples. Event graph analysis can aid in identifying state variables, in determining what events must be initially scheduled, in anticipating possible logic errors due to simultaneous events, and in eliminating unnecessary event routines prior to coding a simulation. Schruben does not disclose constructing a flowchart that describes interaction of an operator in a workcell using a computer wherein such interaction comprises sequential operations and asynchronous operations. Schruben also does not disclose modeling the operator as an input to a programmable logic controller (PLC) by writing a control model of the operator interaction in the workcell based on predefined conditions described in the flowchart.

In contradistinction, independent claim 1 claims the present invention as a method of logical modeling operator interaction with a programmable logic controller logical verification system. The method includes the steps of constructing a flowchart that describes interaction of an operator in a workcell using a computer wherein such interaction comprises sequential operations and asynchronous operations. The method also includes the steps of modeling the operator as an input to a programmable logic controller (PLC) by writing a control model of the operator interaction in the workcell based on predefined conditions described in the flowchart. The method includes the steps of testing the control model by a PLC logical verification system on the computer as to whether PLC logic for the workcell is correct. The method further

includes the steps of loading the PLC logic in the PLC controlling the workcell if the PLC logic for the workcell is correct and using the PLC logic by the PLC to operate the workcell. Independent claims 9 and 15 are similar to claim 1, include other features of the present invention, and have been amended to clarify that the operator is a human operator.

The United States Court of Appeals for the Federal Circuit (CAFC) has stated in determining the propriety of a rejection under 35 U.S.C. § 103, it is well settled that the obviousness of an invention cannot be established by combining the teachings of the prior art absent some teaching, suggestion or incentive supporting the combination. See In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 U.S.P.Q. 657 (Fed. Cir. 1985); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 221 U.S.P.Q. 929 (Fed. Cir. 1984). The law followed by our court of review and the Board of Patent Appeals and Interferences is that "[a] prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." In re Rinehart, 531 F.2d 1048, 1051, 189 U.S.P.Q. 143, 147 (C.C.P.A. 1976). See also In re Lalu, 747 F.2d 703, 705, 223 U.S.P.Q. 1257, 1258 (Fed. Cir. 1984) ("In determining whether a case of prima facie obviousness exists, it is necessary to ascertain whether the prior art teachings would appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitution or other modification.")

None of the references cited, either alone or in combination, teaches or suggests the claimed invention of claims 1 through 15. Specifically, Banks merely discloses a handbook of simulation in which an entity can be dynamic in that it "moves" through the system, verification of an operational model, and validation of the conceptual model being an accurate representation of the real system. Banks lacks constructing a flowchart that describes interaction

of an operator in a workcell using a computer wherein such interaction comprises sequential operations and asynchronous operations and modeling the operator as an input to a programmable logic controller (PLC) by writing a control model of the operator interaction in the workcell based on predefined conditions described in the flowchart. Banks also lacks testing the control model by a PLC logical verification system on the computer as to whether PLC logic for the workcell is correct and loading the PLC logic in the PLC controlling the workcell if the PLC logic for the workcell is correct. In Banks, there is no logical modeling of operator interaction with a programmable logic controller logical verification system and there are no asynchronous operations of the operator. Also in Banks, there is no modeling of an operator as an input to a programmable logic controller (PLC). Further, Banks is not used to debug PLC logic.

Schruben merely discloses that an event graph can be used to develop alternative event-oriented representations of a system in which several candidate model structures can be considered for possible implementation as discrete-event simulations using an event-scheduling approach. Schruben lacks constructing a flowchart that describes interaction of an operator in a workcell using a computer wherein such interaction comprises sequential operations and asynchronous operations. In Schruben, there is discrete event simulations, which are time based, and cannot account for asynchronous operations. Further, there is no modeling of an operator as an input to a programmable logic controller (PLC). As such, there is no suggestion or motivation in the art to combine Banks and Schruben together.

As to the level of ordinary skill in the pertinent art, in Banks, an entity can be dynamic in that it "moves" through the system. In Schruben, discrete event simulations are used for time dependent events and do not allow for asynchronous operations, which are not time dependent. Further, neither reference allows for modeling of an operator as an input to a

programmable logic controller (PLC). As such, there is absolutely no teaching of a level of skill in the programmable logic controller art that a method of logical modeling operator interaction with a programmable logic controller logical verification system includes the steps of constructing a flowchart that describes interaction of an operator in a workcell using a computer wherein such interaction comprises sequential operations and asynchronous operations, modeling the operator as an input to a programmable logic controller (PLC) by writing a control model of the operator interaction in the workcell based on predefined conditions described in the flowchart, and testing the control model by a PLC logical verification system on the computer as to whether PLC logic for the workcell is correct. The Examiner may not, because he doubts that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in the factual basis. See In re Warner, 379 F. 2d 1011, 154 U.S.P.Q. 173 (CCPA 1967).

The present invention sets forth a unique and non-obvious combination of a method for logical modeling of operator interaction with a programmable logic controller logical verification system that allows a user to verify that the PLC code being planned will work as intended, prior to physically building the tools/manufacturing line and locating equipment. Unlike the prior art, the focus of the present invention is on the logical representation of the operator and not the visual or spatial representations of the operator.

The references, if combinable, fail to teach or suggest the combination of a method of logical modeling operator interaction with a programmable logic controller logical verification system including the steps of constructing a flowchart that describes interaction of an operator in a workcell using a computer wherein such interaction comprises sequential operations and asynchronous operations, modeling the operator as an input to a programmable logic controller (PLC) by writing a control model of the operator interaction in the workcell

based on predefined conditions described in the flowchart, testing the control model by a PLC logical verification system on the computer as to whether PLC logic for the workcell is correct, loading the PLC logic in the PLC controlling the workcell if the PLC logic for the workcell is correct, and using the PLC logic by the PLC to operate the workcell as claimed by Applicants.

Further, the CAFC has held that "[t]he mere fact that prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification". In re Gordon, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984). The Examiner has failed to show how the prior art suggested the desirability of modification to achieve Applicants' invention. Thus, the Examiner has failed to establish a case of prima facie obviousness. Therefore, it is respectfully submitted that claims 1 through 15 are allowable over the rejection under 35 U.S.C. § 103.

Obviousness under § 103 is a legal conclusion based on factual evidence (In re Fine, 837 F.2d 1071, 1073, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988), and the subjective opinion of the Examiner as to what is or is not obvious, without evidence in support thereof, does not suffice. Since the Examiner has not provided a sufficient factual basis, which is supportive of his/her position (see In re Warner, 379 F.2d 1011, 1017, 154 U.S.P.Q. 173, 178 (C.C.P.A. 1967), cert. denied, 389 U.S. 1057 (1968)), the rejection of claims 1 through 15 is improper. Therefore, it is respectfully submitted that claims 1 through 15 are allowable over the rejection under 35 U.S.C. § 103.

Based on the above, it is respectfully submitted that the claims are in a condition for allowance, which allowance is solicited.

Respectfully submitted,

By: _____
Daniel H. Bliss
Registration No. 32,398

BLISS McGLYNN, P.C.
2075 West Big Beaver, Suite 600
Troy, Michigan 48084
(248) 649-6090

Date: November 27, 2006

Attorney Docket No.: 0693.00257
Ford Disclosure No.: 200-0665